

REMARKS

Each of the independent claims and hence all of the claims have been further amended to even more clearly define novel and patentable subject matter over the Carr reference and reconsideration and allowance thereof as amended is requested for the following reasons.

Entry for Appeal

Applicant also requests that the foregoing amendments to the claims be entered at least for purposes of any necessary appeal to simplify and clarify the issues for any appeal.

The Rejection

Dependent claims 5, 8, 11, 16, 19 and 23 were rejected only under §103 as being unpatentable over Carr and the remaining claims were rejected under §102(b) as being anticipated by or lacking novelty over Carr.

For at least the reasons stated below, with respect to each of the independent claims, applicant respectfully disagrees with the interpretation of the Carr reference as set forth in the Final Office Action. If, after considering the following remarks, the interpretation of Carr set forth in the Final Office Action is adhered to, then it is respectfully requested that an explanation of the basis for such interpretation of the Carr reference be provided so that applicant can give consideration thereto.

Independent Claim 1

Independent claim 1 was rejected only under §102(b) as being anticipated by Carr which discloses in Figs. 5 and 6 a discharge check valve for a high speed air compressor which rapidly opens and closes in response to pressure changes in the cylinder or chamber 10 in response to reciprocation of a piston therein. When this valve opens, its ball head 27 bears on the positive stop 34 and compresses optional spring 40 whose sole stated purpose is to more rapidly return the ball 27 to its closed position during the suction stroke. This valve does not regulate, control or maintain the pressure of compressed air downstream of its valve head 27. Rather, in use, it merely opens to discharge gas compressed from the cylinder.

Amend Independent Claim 1

As amended, independent claim 1 is not anticipated by and defines at least the following points of novelty over Carr:

- (1) The valve head does not engage any stop when in its open positions;
- (2) In cross-section in a plane containing the longitudinal axis (as shown in Figs. 2-8), the radius or diameter of the surface of the valve bore (a) varies, (b) increases, and (c) increases non-uniformly from its upstream end closest to the valve seat to its downstream end;
- (3) The interface angle increases as the valve head is increasingly displaced from the valve seat; and
- (4) This in cooperation with the valve bore and head surfaces provides (a) downstream of the valve head, (b) a relatively constant pressure curve, (c) over a range of flow rates of fluid through the valve bore.

Carr does not disclose or teach any of these points of novelty. With respect to point (1), in Carr, when the valve is opened, the valve head 27 bears on the positive stop 34 and the sole stated purpose of the optional spring 40 is to more rapidly return the valve head 27 to its closed position during the suction stroke of the compressor (Col 5, Lines 7-16).

With respect to point (2), Carr discloses the bore having a surface 29 with a single radius of curvature in cross-section (Col 4, Lines 1, 2) [which is consistent with the showing in the drawing figures]. Thus, in Carr in cross-section the radius or diameter of the bore surface 29 does not vary, does not increase downstream of the valve seat, and does not increase non-uniformly downstream of the valve seat. This is consistent with the statement in Carr that “leading upwardly and away from the seat is the smoothly curved expanding diameter surface 29 which intersects and forms a circular opening in face 24a of greater diameter than the ball” (Col 3, Lines 64-68) because this refers to surface diameters in succeeding planes perpendicular to the longitudinal axis of the bore. This is not the radius or diameter defined by amended claim 1 which defines the radius of curvature of the bore surface in cross-section in a plane containing the longitudinal axis of the valve bore.

With respect to point (3), Carr has no disclosure or teaching of any interface angle at all. Furthermore, since in Carr the valve head 27 is a sphere and the bore surface 29 in the plane containing the longitudinal axis has a constant radius and hence is a semi-spherical surface, the interface angle in Carr is constant and does not increase as the valve head is further displaced from the valve seat.

With respect to point (4), Carr does not have any disclosure or teaching of regulation of the fluid pressure downstream of the valve head, of any relatively constant pressure curve downstream of the valve head, or any relatively constant pressure curve over a range of flow

rates of fluid through the valve bore. Rather, Carr simply discloses a discharge check valve which opens whenever a designed net threshold pressure upstream of the valve head is exceeded as the upstream gas is compressed by the compressor. Indeed, after the valve opens and bears on the stop 34, the upstream gas pressure typically will further increase as the compressor rapidly completes its compression stroke and then will close on the suction stroke. This Carr check valve simply does not regulate or control the pressure of the gas downstream of its valve ball head 27 which normally varies significantly depending on the pressure in the tank or other vessel into which the compressed gas is discharged by the compressor.

Accordingly, for at least these reasons, amended claim 1 is not anticipated by and defines both novel and patentable subject matter under §§102 and 103 over the Carr reference and should be allowed.

Claims 2-11

Each of claims 2-11 is ultimately dependent on amended claim 1 and hence defines novel and patentable subject matter for at least the reasons for which claim 1 does so and should be allowed.

Independent Claim 12

Independent claim 12 has all four of the foregoing points of novelty of claim 1 and hence is not anticipated by Carr and defines both novel and patentable subject matter over Carr for at least the foregoing reasons for which claim 1 does so and should be allowed.

Claims 13-19

Each of claims 13 through 19 is ultimately dependent on claim 12 and hence defines novel and patentable subject matter for at least these reasons and should be allowed.

Independent Claim 20

While in some respects claim 20 is broader than claim 12, it is still not anticipated by and defines novel subject matter over the Carr reference for at least the reasons set forth above with respect to points (1), (2) and (4) for which claim 1 does so. Accordingly, claim 20 defines novel and patentable subject matter under §102 and §103 and should be allowed.

Claims 21-23

Each of claims 21-23 is ultimately dependent on claim 20 and hence defines novel and patentable subject matter for at least the reasons for which claim 20 does so and should be allowed.

Claims 24-26

As amended, independent claim 24 defines a method of making a pressure control valve which, among other things, includes steps producing the four points of novelty set forth above in connection with claim 1 and thus defines a novel and patentable method over the Carr reference for at least the reasons set forth above with respect to claim 1. Accordingly, amended independent method claim 24 and claims 25 and 26 each ultimately dependent thereon are novel and patentable and should be allowed.

Conclusion

For the foregoing reasons, each of claims 1 through 26 as amended is believed to define novel and patentable subject matter over the Carr reference and to be in a condition for allowance and such action is respectfully requested.

If, after considering this Response, the Patent Office is of the view that any of the claims are not allowable, a telephone interview with the Examiner is hereby requested with applicant's undersigned attorney, William H. Francis, so that immediate consideration can be given to any further amendments suggested by the Examiner or otherwise needed to place all the claims in a condition for allowance. Applicant's attorney can normally be reached Monday through Friday between 9:00 A.M. and 5:00 P.M. at (248) 689-3500.

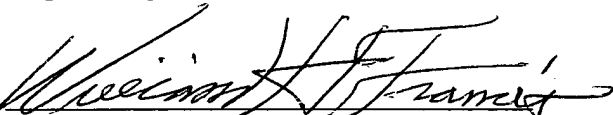
We believe no fees are due with this Response; however, if the Patent Office determines otherwise, it is hereby authorized and respectfully requested that any fees due be charged to our Deposit Account No. 50-0852.

Respectfully submitted,

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WHF:sal

By



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